Work System Design
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Lecture - 11
Work Study: Basic Concept

Namaskar friends welcome to session 11 in our course on Work System Design. Today we are going to start our discussion on Work Study. In the last 2 weeks our focus was primarily on understanding the concept of productivity. We have seen that what do we mean by productivity. What are the various definitions of productivity? and then we have tried to understand the factors affecting productivity, the causes of low productivity.

And also the productivity improvement techniques. We have also seen certain numerical problems that how mathematically we can calculate productivity and also seen certain case studies where the improvements have been incorporated by certain changes in the way we do the work.

If you remember in the last session that was session number #10 in this course we have seen that if we change the design of the product, if we change the process by which we manufacture the product. If we change the way, the environment that we provide for our employees so we can definitely improve the productivity of an organization.

So the main we can say issues are related to the way we do the work, the way our work system is designed, the way the persons or the workers or the engineers or the managers are doing their task. So that is very, very important. So we need to understand that how the work is being done, who is doing it, why it is being done in that particular manner only. Whey there cannot be a better way of doing the same task which is more economical, more safe, more enjoyable for the worker.

So the work system or design or the work study concerns with all these aspects where we try to make the work enjoyable for the worker. We try to make the work safe for the worker. We try to make the work productive for the worker. We try to make the work we can say efficient and effective for the worker. So basically when we try to design our work we have to take

into account that what can be the best way of doing the work and what can be the best time in which the work can be done.

So basically there are 3 important things that we must try to take into account. The point number #1 is the way the method which is to be adopted, the sequence of steps which are to be adopted to complete the work that is our #1 focus, #2 focus is to find out the time required to perform this work in the most best way or we can say in the standard way that we have identified at point #1.

So at point #1 we try to see that what is the best way of doing this work. At point #2 we try to find out the time required for doing this work and at point #3 we have to see that the environment that we are providing to the workers whether it is safe or not what type of temperature, humidity control must be there. So it is related to the ergonomic aspect of the work system that the work is designed in such a way that it is safe and it is easy for the worker to perform the task.

So we will see there are different types of ergonomic aspects also like organizational, physical, cognitive, so that we will come to that towards the end our discussion, but today our focus is to understand the basic concept of work study that why do we need to undertake this course, why do we need to teach this course, why do we need to discuss this course among us and try to enlighten ourselves that what is the importance of work system design.

Usually we see a work is assigned to a worker, he tries to complete the work by whatever way he finds comfortable. Most of the time the method the worker may have adopted may not be correct. There can be a better method. There can be assistive device which can make his life easy, which can make his work light, which can make his work enjoyable, but most of the time the people start working without giving much credence to affect that there can be better methods of doing this work.

So therefore we need to scientifically analyze the work and try to understand and develop the best ways of doing the work. So with this background we will start our discussion on work study and then we will see that what are the standard steps involved for solving any problem related to work study. So let us start our discussion.

So on your screen it is you can say collage of images, you can see that what is work study. Now work study basically you can see is related to the way the work is being done. So 2 words are there work and study. So you can see on the screen there is a word work and there is a work study. So first is work and second is study. Now each one of you know that work basically all of us are doing some work.

I am speaking here in front of the camera in this recording studio, now this is a work being done. Now maybe there can be person sitting who are analyzing that how I am speaking, how much energy I am consuming in doing this task, whether the light is sufficient or not, whether I am feeling comfortable or not, whether I am sweating or maybe if I am drinking water, stopping the recording in between number of times it means maybe I am not comfortable doing this task.

So that is the study part. So I am doing the work that is the work part, the analysis that how I am doing, how I am feeling, what can be the best way, I am standing and speaking if I am made to sit and speak whether that will be a better way of recording these lectures, so that is basically the term work study. So the work is being done, we are using certain tools. These tools are basically to make the learners more involved in this teaching learning process or in this discussion.

So whether these tools are sufficient or we need to have more tools which can further improve the way this work is being done so that is basically the concept of work study. A work is being done it has to be studied that how it can be made better. What can be one standard way of doing this work so that it is best for all the stakeholders involved in this process. Who are the stakeholders involved in this process?

The stakeholder involved are the recording people who are experts in recording the videos, Then I am one of the stakeholder who is speaking, then there are teaching assistants who are helping me in this recording purpose then the learner who are registering for the course and who are undertaking this course listening to the lectures, trying to read different books and grasp the concept of work system design.

So all these stakeholders must be happy. So the work must be designed in such a way that all stakeholders enjoy the experience of this work that we are doing. So that is the basic concept,

work is being done. This is not the only work, lady or a housewife preparing lunch in the kitchen is also a work that is being done. Now how we can analyze it, we can analyze the movements that she does inside the kitchen.

Maybe from refrigerator to the sink and to the working floor to the stove or to the gas stove so that all these movements can be analyzed and how those movements can be minimized so that she feels comfortable after preparing the lunch. She is less tired after preparing the lunch. So all that is okay you can say a work being done and then there can be a person who is a work study analyst who can analyze the way she is doing her task and then finally help her in improving her productivity and efficiency in the kitchen.

So 2 examples from our life I have taken and I think this will help you to appreciate the concept of work study and on your screen you can see we can apply the concepts of work study in the office space also.

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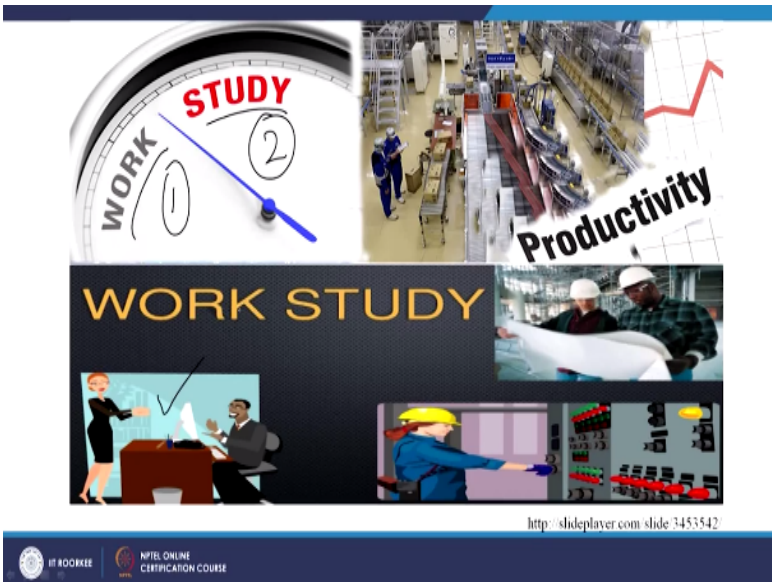

We can apply the concepts of work study in the shop floor also where some manufacturing activity is being done. We can apply the concept of work study in the construction industry, we can apply the work study in a place where the control of machines and equipment is being done maybe this can be a control panel of a thermal power plant. So the concept is universal concept.

It is not specific to one particular branch of engineering or one particular area of application. So from civil engineering to mechanical engineering to production engineering to

management to chemical engineering, textile engineering the concept is universal in nature. So we will try to understand further that how we can do a work study. So first we need to understand what is work study.

Now before going into the concept of work study just quickly I will read these points that are there on the screen and you can just try to understand them there is nothing much to analyze here, it is just maybe defining the concepts or trying to have certain knowledge regarding how work study developed. So F. W. Taylor is the founder of modern method and time study. Taylor began his time study way back in 1881.

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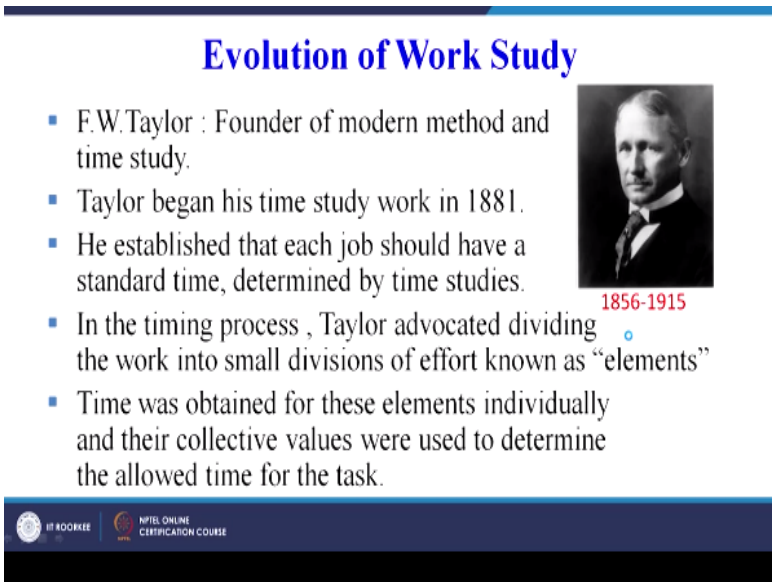

He established that each job should have a standard time, determined by the time studies, in the timing process Taylor advocated dividing the work into small divisions of effort known as elements. Time was obtained for these elements individually and their collective values were used to determine the allowed time for the task. So this is one important aspect of work study.

In work study first we have to establish the one best method or the most optimized method for doing the work and for that standard method we need to calculate that how much time must be required to complete this task. So the task is divided into different elements and these each element are timed using maybe one of the methods is stopwatch time study. So we may use a stopwatch time study to time this method and then the allowances are added.

We calculate the time for each element then add the times for each element to calculate the standard time that is the second part of our work study. First is finding out the best method.

Second is finding out the time required to do the task using that best method. Now work study has many other names also.

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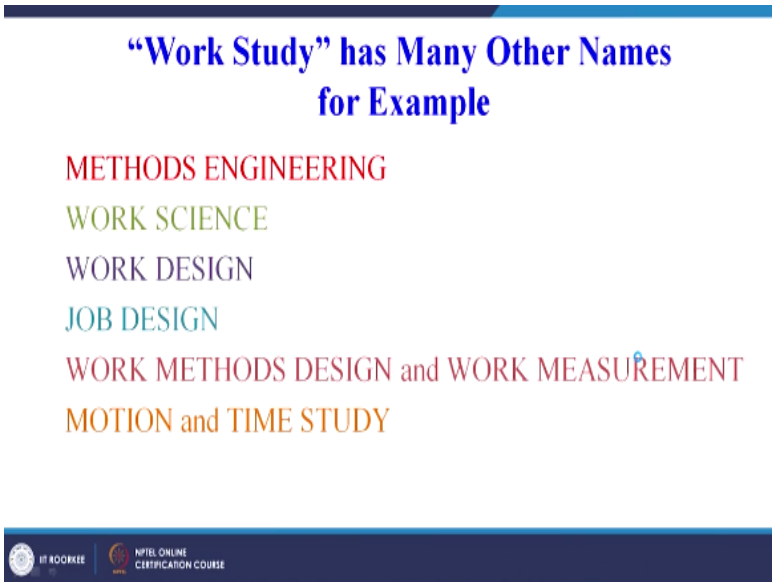

Now in most of the courses or most of the books that you will see there can be a term called methods engineering, work science, work design, job design, work methods design and work measurement, motion and time study. So you will have different names to this design or to this subject, but our course is designed as work system design.

So we are not only talking of individual work elements we are taking work as a complete system and trying to design the system. So that with the objective that the work being done in the most productive and efficient manner. Now this is just one example which is taken of the garment manufactures. So this example you can say why do we need work study?

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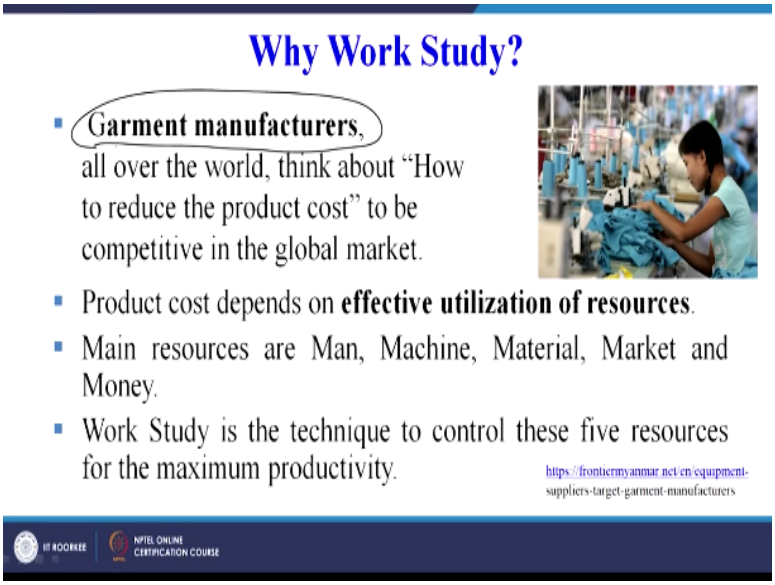

So how garment manufactures can adopt. As I have already told this is a universal concept. So in any industry you can use the concept of work study so garment manufactures all over the world think about how to reduce the product cost to be competitive in the market. So their objective is clearly mentioned how to reduce the product cost. So if you remember last 2 weeks we have focused primarily on productivity.

Now from productivity point of view most of the time cost goes in the denominator that is it is an input. So if you are able to reduce your input, reduce the cost of manners that go into the garment manufacturing process automatically the productivity will go up. Because the productivity is inversely proportional to the inputs. So if you are able to control the input we are always going to increase our productivity.

So how to reduce the product cost to be competitive in the global market. So product cost depends upon effective utilization of resources. So if we are able to effectively utilize our resources our product cost can be controlled. Now what are the main resources, it is already mentioned, man that is the work force, machine, material, market and money. So if you are able to put focus on all these 5 resources we can control our product cost.

If we can control our product cost, we can easily improve the productivity of our organization. Now work study is the technique to control these 5 resources for maximum productivity. So the word productivity is coming in this slide also which easily explain that why we have focused our 2 weeks of discussion on the word productivity because we need to

do the work in such a way that our organization is productive, profitable, efficient and effective.

So we need to focus on these 5 resources, so once again we can say man, machine, material market and money. So if we focus on these 5 resources definitely we can make our organization profitable. Now this brings us to why do we need to do the case study. The garment manufactures want to reduce their product cost they want to focus on the 5 M's, why in order to be more productive.

So what is the aim of work study? To analyze the work in order to achieve work simplification and thereby improving productivity of the system.

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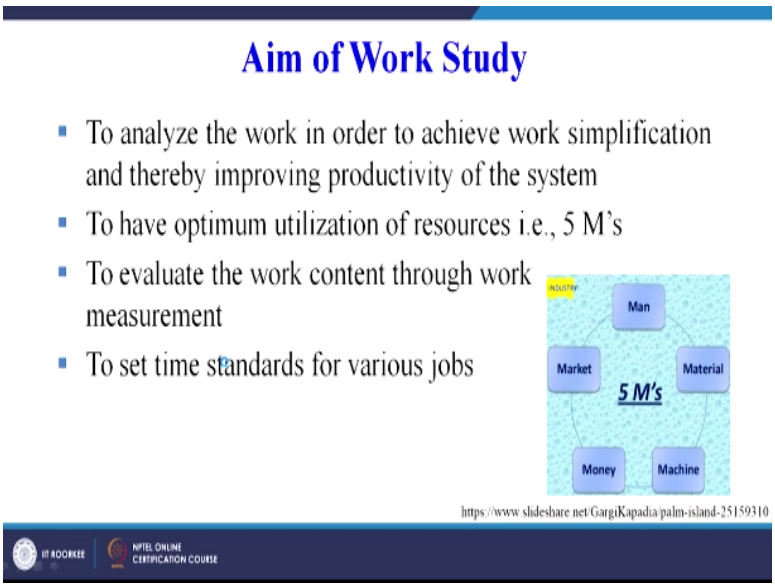

So work simplification will help us to improve the productivity of the system and how we can achieve work simplification we can achieve it through systematic work study. To have optimum utilization of resources that is the 5 M's which are given in this figure, man, machine, material, money all these are the 5 M's which can be used. Here the another M is coming into picture that is market.

Whereas in previous case we have, yes, market is also there, so these are the 5 M's that are given in the previous slide also. So 5 M's we have to focus. To evaluate the work content through work measurement so this is the second term. So first is we have to focus on work simplification or methods study where we will try to develop the best method of doing the work.

Then we will do work measurement and try to find out how much time is required to do this work and to set the time standards for various job. So it will help us in better production planning and control better utilization of our resources. So the overall summary is that we have to look for the best methods of doing the work and then we have to set standard time for doing this work.

So we may set the standard time for the individual elements and then we can add the time taken for each element in order to find out the total time required to do the job but that has to be a standard time which will be used for all other calculations. Now need for work study we can see principles of work study have been used since long.

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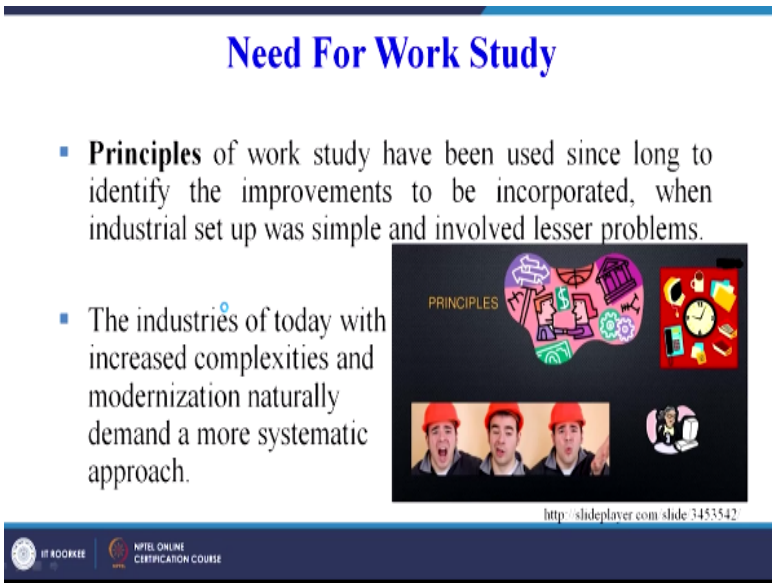

We can see that F. W. Taylor started the concept of work measurement in 1881, so these are not new principles they are in place for a long, long time. To identify the improvements to be incorporated. So these principles have been used to find out that what can be done. How the work can be done in a most economical or most effective manner. When industrial setup was simple and involved lesser problem.

So these simple principles were used when our systems were fairly simple, our systems were fairly easy to analyze, but now in today's scenario if you see the industries of today with increased complexity. You can see it is mentioned on the screen, with increased complexity and modernization naturally demand a more systematic approach. So what is the requirement? it requires more systematic approach.

And what is this more systematic approach? the more systematic approach is the approach of work study. So we need to focus on work study in order to clearly outline the best methods of doing the job and clearly outline the time required for doing the job. Usually what happens when we do not have any information or when we are not aware of the scientific techniques like work study, we assign work to the worker just based on our experience or based on our intuition.

And we do not have any time standard to analyze whether the worker is doing the job satisfactorily in maybe defined time or not. It is just may be based on just gut feeling or experience, but if we have a scientific method of identifying that what must be the standard time required for doing this task we will be more confident while assigning task to our employees.

Moreover, the salary that we are going to pay to these employees can also be correlated to the amount of work that they are going to do. So therefore we need to have a better understanding of the concept of work study and the tools and techniques that help us in undertaking this study and in our course we will focus on the various tools and techniques some of them may be graphical, some of them maybe mathematical.

And try to understand that how these tools and techniques can help us in performing our work study. So work study let us see the definition it has been broken down into 3-4 points.

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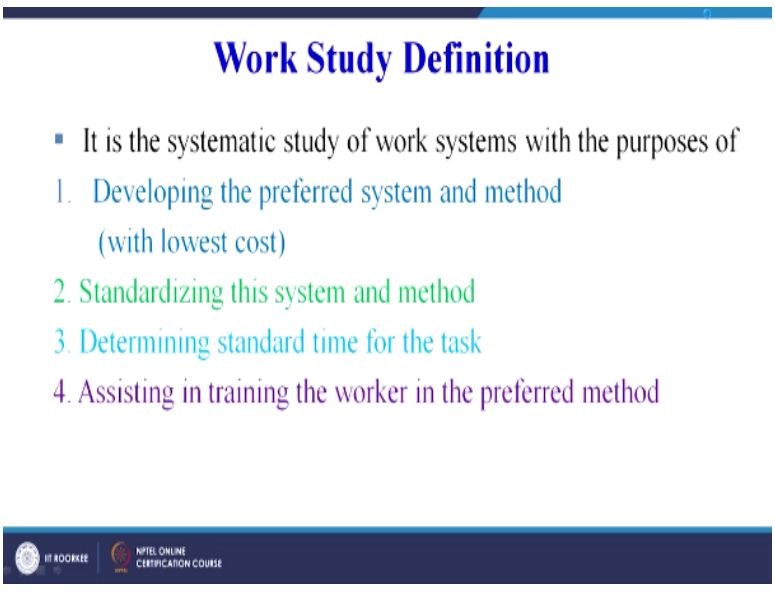

So it is a systematic study, so first thing is it is not abstract, it is objective, it is systematic. So first point to keep in mind is that it is a systematic study of work systems with the purposes of, now why do we need to do the study developing the preferred system and method. So we need to find out a preferred system or method which is the best method for doing the task then standardizing this system and method.

So first is we have to develop this method then we have to standardize it maybe if we find out that this is the best method of doing this work we can divide the total method into 4 sequence of steps. We can say that if you follow these 4 sequence of steps then you are going to achieve your target and the minimum possible time for example suppose we have to make a hole in a plate.

So when the drilling operation has to be carried out hole has to be made a specific diameter is given to us. We can easily find out that what are the 4 steps required to do this job, maybe one of the first step can be center punching, then it can be drilling, then it can be boring, then it can be reaming that is the finishing operation. So then we can standardize this method that when a hole has to be made in this plate of maybe 10 mm thick using a twist drill these are the 4 steps to be followed and each step will take some time.

So our till second point first is we have to develop the preferred system and method so we have already found out we have developed the preferred system that these are the 4 steps center punching, drilling, boring, and reaming so that we have standardized. Second is standardized, third is determine the standard time.

So then we have to calculate that what is the standard time for doing this task when we have to make a hole in a 10 mm thick mild steel or a metallic plate using of this much diameter we have to find out how much time will be required for each work element, 4 work elements I have already highlighted we have already standardized the procedure for making a hole. So now for each work element we have to calculate how much time it will take.

And then we will add up the time for individual element to find out the standard time for hole making operation in a metallic plate. Then assisting and training the worker in the preferred method, then the fourth is training that we have to guide, we have to train, we have to mentor our workers and teach them the standard procedure for hole making and then we have to train

them in such a way that they are able to achieve this task within the standard time that we have calculated for this operation.

So our work study will help us to achieve all these 4 purposes. So we will learn the tools and techniques that will help us to achieve all these 4 purposes if that are the purposes of undertaking any work study assignment. Now this is as per the BSI that is British Standard Institution.

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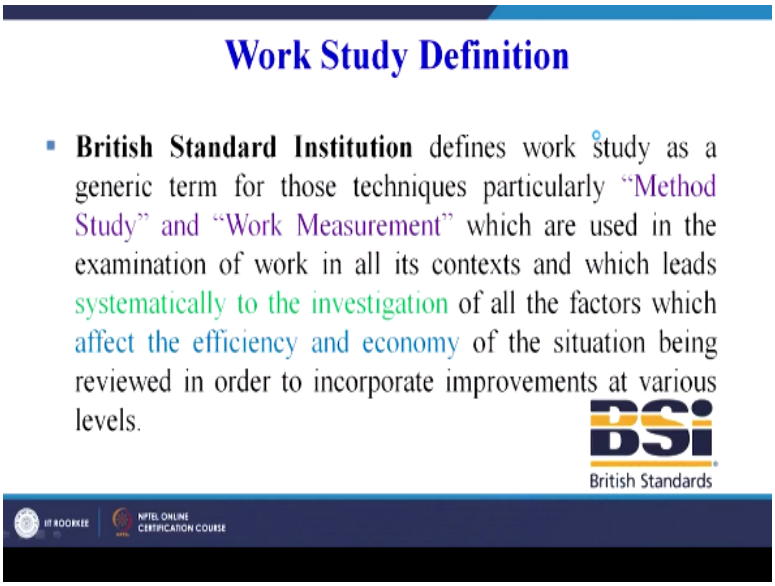

Let us again read this definition defines work study as a generic term for those techniques as I have already told we will focus on certain tools and techniques in our course which will help us to undertake work study particularly method study and work measurement. Again the same concept is coming we have to develop the best method using method study and then calculate the standard time for doing the task or using the best method by work measurement.

So particularly method study and work measurement which are used in the examination of work in all it is context and which leads systematically to the investigation of all the factors which effect the efficiency and economy of the situation being reviewed in order to incorporate improvements at various level. So the target is to incorporate improvements at various levels.

So basically we can say work study is the combination of method study and time study and both these individual elements have got their own object. So method study will have it is own objective it is own scope and maybe it is own technique different graphical aids can be used

for method study so which is in itself a complete module and work measurement is another module.

So once we have developed the best method then we will use work measurement to find out the standard time required for completing the job using the standard procedure or task. Now this is the framework of work study. I think everything has been explained so this is the more general term that is work study then it is made up of method study and work measurement and overall it leads to higher productivity.

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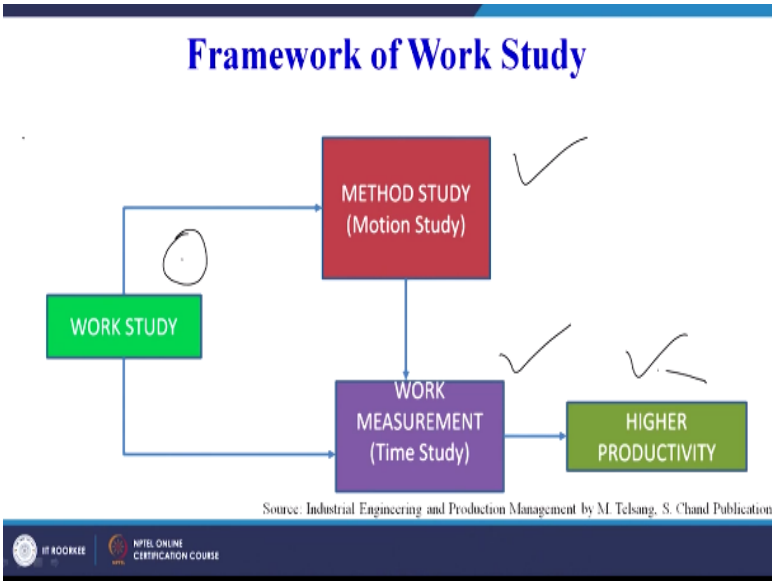

So our target is to increase the productivity by finding out better methods, best methods for doing our work as well as doing it in the standard time. So components of work study quickly we will read or I will try to highlight as we have seen in the previous slide method study and work measurement.

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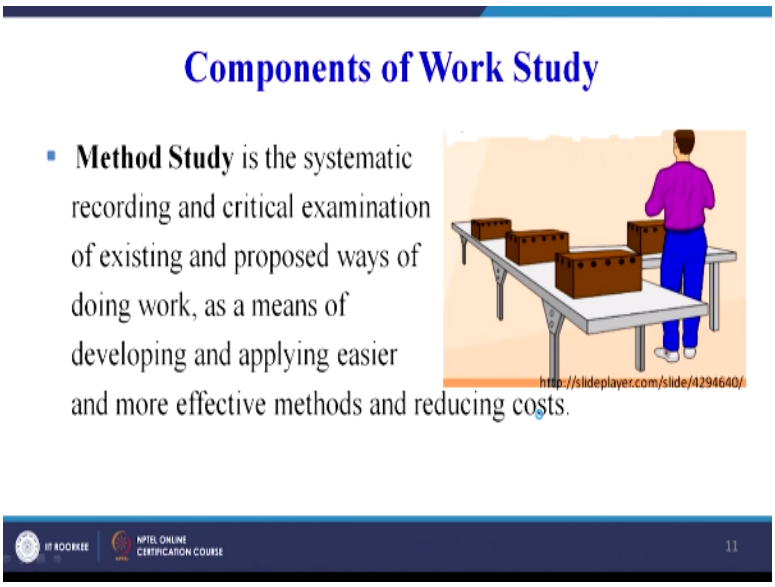

So what is method study? Method study is the systematic recording and critical examinations. Two important terms are there systematic recording so we have to record or we have to systematize that how the work is being done maybe what are the steps followed or what are the various work element, systematic recording and critical examination. We will go to the term critical examination when we focus on work study of existing.

That is what is the current way of doing the job and proposed ways of doing the work as means of developing and applying easier and more effective. What is our target? the method that we propose must be easier and more effective as well as it must be cost saving. So 3 we can say objectives are there it must be an easier method. It must be an effective method and it must be a cost effective method.

So we will analyze what is the current way of doing the work then we will propose what is the new way or what is the creative way or what is the most effective, cost effective as well as safe as well as easier way of doing the work. So that is the target of method study but that we will do systematically and after critical examination of our current method of doing the work.

So that is method study which is one important of work study. Second one is the work measurement as you can see a watch here so it is related to time.

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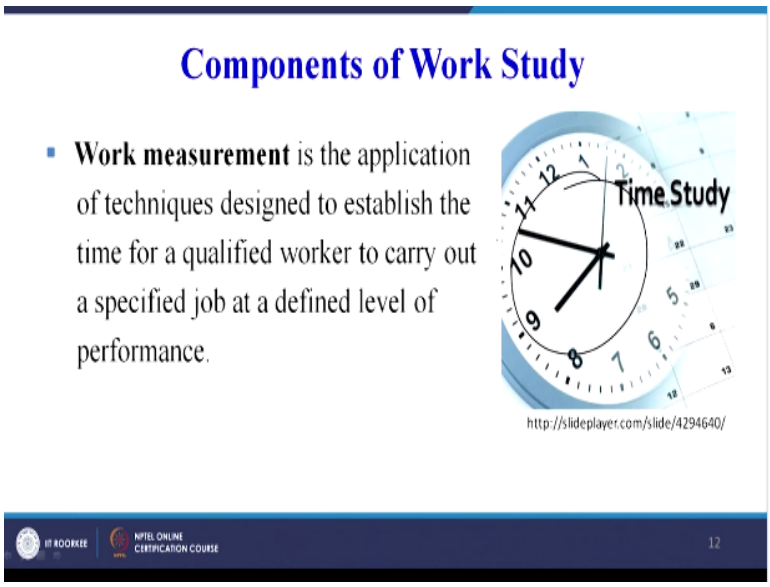

So work measurement is the application of techniques, this is also a set of techniques there are different techniques like stopwatch time study then there are work sampling predetermined motion time systems so there are different techniques under work measurement which are designed to establish the time. So what is we need to do? we need to establish the time for a qualified worker.

Who is a qualified worker? we will study this when we will go to work measurement to carry out a specified job. What is a specified job? which has been established by the method study at a defied level of performance. So this we will establish using work measurement. So in method study we will setup best method of doing the job and in work measurement we will try to find out that how much time this best method will require.

So work measurement is application of techniques designed to establish the time for a qualified worker to carry out a specified job at a defined level of performance. Now relationship between method and work study. Method study is concerned with the reduction of the work content and establishing one best way of doing the jobs.

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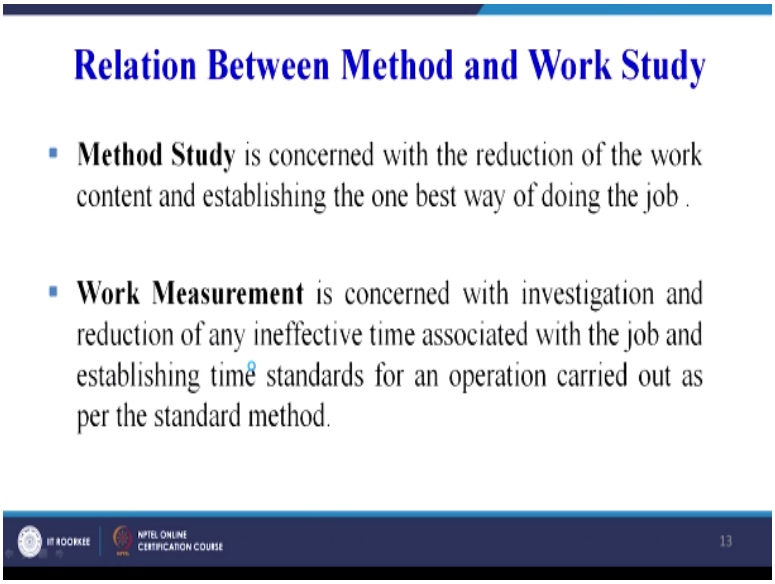

So here the final thing is coming that why do we do method study to find out the one best way of doing the job and work measurement is concerned with investigating and reduction of any ineffective time associated with the job and establishing time standard for an operation carried out as per the standard method. So the operation has to be caried out as per the standard method.

And from where we will get the standard method? this we will get from our method study. So both are related. So method study and work measurement are related to each other so we have to set the time standard for the standard method only. Now what is the importance of work study that why do we need to do we already know that we have to find out the best way of doing the work and we have to find out the time required for doing the work using the best way.

So how it will help us? what is the importance? It is the mens of enhancing the production efficiency that is productivity of a firm by elimination of waste and unnecessary operation.

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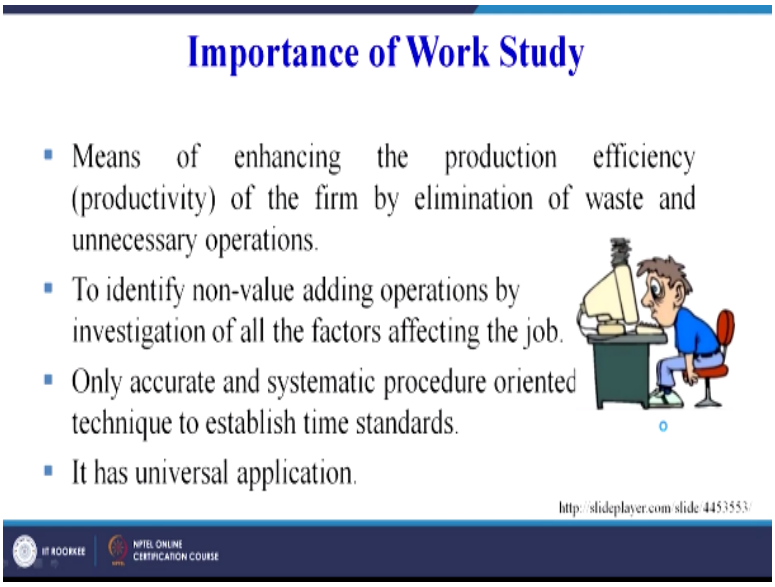

So when we will do method study automatically our focus will be to identify the unnecessary operations and to remove them also it will help elimination of waste so we will be able to eliminate the waste also. To identify non-value added operations that also we will identify and try to eliminate by investigation of all the factors affecting the job. Only accurate and systematic procedure oriented technique to establish the time standard.

Thereby we will establish the time standards which will help us in better management of our operation how because we will be able to plan our resources accordingly. We know that what is the standard time required for doing different operations and accordingly we can do our production planning activity. Now it has a universal application which I have already highlighted in the previous discussion.

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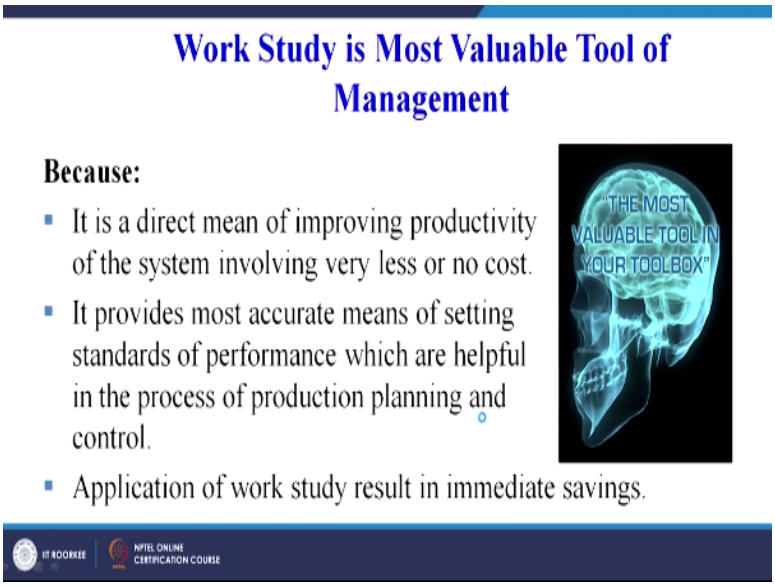

Now work study is the most valuable tool of management why because it is a direct mean of improving productivity of the system involving very less or low cost. You need not hire more people, you need to train the exiting staff only who can come up with very innovative and creative solutions to the current way of doing the job and we will take certain case study where maybe the workers have come up with nice ideas, very creative ideas and have improved the way of doing the work.

It provides most accurate means of setting standards of performance which are helpful in the process of production planning and control. I have been highlighting this in today's session again and again that if we know the exact time required for doing certain operations it will definitely help us in our production planning and control activity. Application of work study results in immediate saving.

So when we are able to do our work in the most efficient and effective manner in the most productive and profitable manner we will immediately realize the savings that we can accrue after doing a systematic work study. So with this I think we conclude the today's session and in next session we will see that how systematically we can do the work study operation. Thank you.